TCT-616

Relationship Between Angiographic Dynamic and Densitometric Assessment of Myocardial Reperfusion and Survival in Patients with Acute Myocardial Infarction Treated with Primary Percutaneous Coronary Intervention: The HORIZONS-AMI Trial

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Background: Although primary percutaneous coronary intervention (PCI) restores brisk epicardial flow in ~90% of patients with ST-segment elevation myocardial infarction (STEMI), normal tissue myocardial perfusion (TMP) is less commonly achieved. TMP has been shown to correlate with early clinical outcomes, but its impact on long-term mortality is not well defined. Furthermore, the best methodology for determination of TMP has not been established.
Methods: We analyzed the outcomes of 3,267 patients in the HORIZONS-AMI study according to final TMP, assessed by angiographic dynamic (Dyn) and densitometric (Den) methods. Multivariable analysis was performed to identify the independent influence of TMP grade 2/3 (vs. grade 1/2) on survival.
Results: Dyn TMP 2/3 was achieved in 2,600 patients (79.6%) while Den TMP 2/3 was achieved in 2,483 (76.0%). Mortality was significantly lower in those with Dyn TMP 2/3 compared to TMP 0/1 at 30 days (1.1% vs. 6.9%, p<0.0001) and at 3 years (5.1% vs. 11.2%, p<0.0001). Similar results were obtained with Den TMP. Dyn TMP 2/3 was an independent predictor of mortality at both time points (HR [95%CI] = 0.21 [0.12, 0.37], p<0.0001 and 0.53 [0.38, 0.73], p<0.0001 respectively, Fig.), as was Den TMP. Survival was comparable in patients with TMP 2 and TMP 3.
Conclusion: Angiographic TMP can be assessed reliably using either Dyn or Den methods, and is a powerful, independent predictor of early and late mortality after primary PCI in STEMI. These data suggest TMP rates may be considered as a quality metric for assessing individual or hospital primary PCI outcomes.

TCT-617

Noninvasive Assessment of In-Stent Restenosis by High Definition Computed Tomography Coronary Angiography with New Gemstone Detector

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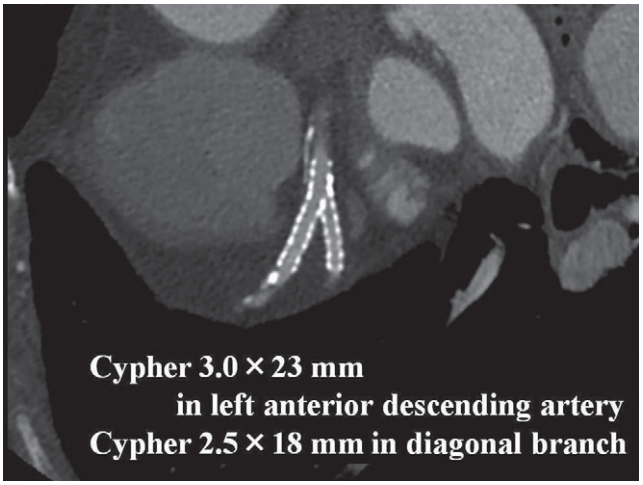
Background: Noninvasive assessment of in-stent restenosis (ISR) by computed tomography coronary angiography has been challenging. Recently high definition computed tomography (HDCT) coronary angiography with new gemstone detector has been developed, which has high spatial resolution, so it may lead to significant improvement of accuracy to diagnose ISR. The purpose of this study is to assess ISR using HDCT coronary angiography.
Methods: We enrolled consecutive 160 patients with previous coronary stent implantation who were received HDCT coronary angiography for clinical indications. HDCT coronary angiography studies were performed using a HDCT (GE Discovery CT750 HD). Image quality for the evaluation of ISR was assessed using 5-point grading scale: IQ score (1=excellent, 5=non-assessable). Significant ISR was defined as >50% luminal narrowing in the stent lumen or the presence of significant stent edge stenosis.
Results: 313 stents (average diameter 3.0±0.5mm) were evaluated. Image quality was good on average (IQ score 2.4±1.0). A total of 39 stents (12%) were of nondiagnostic image quality (IQ score 4 or 5) (feasibility 88%). In 109 stents compared with ICA, sensitivity, specificity, positive predictive value, and negative predictive value were 100%, 99%, 95%, 100%, respectively, when excluding unassessable stents. There was 104 stents, including 87 silorimus-eluting stents, with diameters of <2.5mm, and 75% was assessable (IQ score 2.8±1.1).



Conclusion: HDCT coronary angiography with new gemstone detector allows accurate noninvasive assessment of significant ISR. Noninvasive assessment of ISR using HDCT could be attractive and feasible alternative.

TCT-618

Quantitative Monitoring of Atherosclerotic Plaque Development and Characterization by Flat-Panel Computed Tomography

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Background: Background: Flat-panel computed tomography (FpCT) provides better spatial resolution than 64-channel CT and better assesses atherosclerotic plaque components in vivo in animal aortas similar in size to human coronary arteries. We assessed the usefulness of FpCT in longitudinal studies of plaque development.
Methods: We used a prototype FpCT scanner with a dual-panel rotating gantry and a commercial Performix CT x-ray source. Lesions in 184 aortic histology sections from 6 WHHL rabbits were quantitatively compared with 64-CT (image thickness, 0.625 mm) and FpCT (image thickness, 0.150 mm) images. In the current, long-term phase of the study, 30 NZW hyperlipidemic rabbits receive a high-fat diet (0.5% cholesterol). Lesions are monitored and correlated through monthly serial scanning sessions over 6 months. Images are collected 30 seconds after Visipaque injection (560 mgI/kg; through an ear vein) by using 500 views per rotation. Lesions are quantitatively monitored, and each plaque component is compared.
Results: Although FpCT was more sensitive in detecting eccentric lesions (42% vs 0%; P=0.000), the area under the curve (AUC) for FpCT (0.6) did not significantly differ from that for 64-CT (0.45; P=NS). In detecting plaques with ≤10% lipid (low-attenuation foci), FpCT was more sensitive than 64-CT (24% vs 0.7%; P<0.00) and had a greater AUC (0.6 vs 0.5; P<0.006). Additionally, FpCT was more sensitive (65% vs 0%; P<0.00) in detecting plaques with ≤5% calcium (high-attenuation foci) but not in detecting branch points. Both FpCT and histology could detect low-attenuation foci as small as 0.3 mm in diameter, whereas 64-CT could detect only low-attenuation foci ≥1.5 mm in diameter.
Conclusion: FpCT seems to have more potential in quantitative screening for low-risk small atherosclerotic lesions, whereas 64-CT is limited to imaging established, well-characterized lesions, particularly when measuring the vascular wall thickness in a rabbit model of atherosclerosis. FpCT seems to have potential for quantitatively monitoring the evolution of calcific and lipid components of plaque

TCT-619

Direct Mapping and Digital Reconstructions Of the Human Cardiac Venous Anatomy

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Background: It is important to identify and understand variations in the anatomy of the human cardiac venous system in order to best develop and then use minimally invasive cardiac devices. Hence, anatomical mapping of the cardiac venous system of a large sampling of human heart specimens, with and without disease, will be a beneficial aid for cardiac device designers.
Methods: We utilized fluoroscopy, a Microscribe 3Dx Digitizer (Ghost 3D, Castro Valley CA) and Imageware Software (Siemens, Plano TX) to obtain maps of the cardiac veins and to create 3D models. To date, we have created models for and taken anatomical measurements for 18 perfusion fixed human hearts.
Results: We have created a unique anatomical database for the major cardiac veins that include vessel diameters, arc lengths, tortuousities, and branching angles from the

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